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PLANT EXPLORATION IN IRAN

1955

Howard Scott Gentry

Introduction

Geographical Background

The Central Plateau

The Persian Gulf

The Elburz Mountains

Summary of Plant Collections

Notes on the Persian Plant Collections

Some Progress in the Field

General Remarks on Iranian Flora

PLANT EXPLORATION IN IRAN



THE UNIVERSITY OF CHICAGO

1905

THE UNIVERSITY OF CHICAGO



Illustrations

Plant Exploration in Iran

Fig. 1. Artemisia-Synedrella 1955 collection southward of Esfahan at

5900 feet Howard Scott Gentry

2. *Sagittaria arifolia* and *S. spathulifolia* growing with *Salvinia*

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First National Bank

1932

Second National Bank

Third National Bank

Fourth National Bank

Fifth National Bank

Sixth National Bank

Seventh National Bank

Eighth National Bank

Ninth National Bank

Tenth National Bank

Eleventh National Bank

Twelfth National Bank

Illustrations

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 5. A feathery-leaved Umbelliferae with ornamental appearance on the highlands southeast of Kerman.

Map 1. Routes of travel by Gentry on the 1955 expedition to Iran.

HOWARD SCOTT GENTRY

ITINERARY

Dates with points of travel are given in the following outline. The accompanying map shows the routes traversed by plane and car. Short forays into mountains were made by foot and by horse.

Personnel consisted of Howard Scott Gentry from the Section of Plant Introduction and a number of assistant interpreters and guides furnished by the International Cooperation Administration of Iran from their regional posts. Jeep and Carryall cars were also furnished by this organization for local transport.

- 2 - Arrive in Tiflis and return
- 3 - Arrive in Baku
- 4 - Arrive in Erzurum
- 5-6 - Arrive and vicinity
- 7 - Arrive in Istanbul
- 8 - Istanbul to Ankara
- 9 - Ankara
- 10-11 - Arrive in Isfahan and return
- 12 - Arrive in Shiraz
- 13 - Arrive in Shiraz and return
- 14 - Arrive in Tehran
- 15-17 - Tehran and vicinity
- 18 - Tehran to Isfahan
- 19-21 - Isfahan and vicinity
- 22 - Arrive in Isfahan
- 23-24 - Isfahan to Shiraz, Fars and return

THE CASE

After the death of David and Clara in the following
month, the accompanying map shows the road between the
place and the road. David's house was built in 1800
and is now a ruin.

General condition of David's house in 1800
David's house was built in 1800 and a number of windows were
broken and the house was in a state of ruin.
The house was built in 1800 and was in a state of ruin.
The house was built in 1800 and was in a state of ruin.
The house was built in 1800 and was in a state of ruin.

HOWARD SCOTT GENTRY

IRAN ITINERARY

1955

- 1955
April 11-13 - Beltsville, Md. to Tehran, Iran
13-23 - Tehran and vicinity
24 - Tehran to Ahwas
25-29 - Ahwas to Shusht^{ar}, Desful into ^LZuristan & return
29 - Ahwas to Abadan
30 - Abadan to Shiraz
May 1 - Shiraz
2 - Shiraz to Firuzabad and return
3 - Shiraz to Kazerun
4 - Kazerun to Shiraz
5-6 - Shiraz and vicinity
7 - Shiraz to Isfahan
8 - Isfahan to Kerman
9 - Kerman
10-11 - Kerman to Bam and return
12 - Kerman to Sirjan
13 - Sirjan to Aliabad and return
14 - Sirjan to Kerman
15-17 - Kerman and vicinity
18 - Kerman to Tehran
19-23 - Tehran and vicinity
24 - Tehran to Isfahan
25-30 - Isfahan to Musiabad, Feridan and return

1955

- June 1 - Isfahan
- 2 - Isfahan to Shiraz
- 3-4 - Shiraz and vicinity
- 5-7 - Shiraz to Bavanat and Abadeh
- 8-10 - Abadeh and vicinity
- 11 - Abadeh to Shiraz
- 12-13 - Shiraz and vicinity
- 14-16 - Shiraz to Dasht Arjan and return
- 17-20 - Shiraz and vicinity
- 21 - Shiraz to Fasa and Estavanat
- 22-23 - Estavanat and vicinity
- 24 - Estavanat to Shiraz
- 25-26 - Shiraz and vicinity
- 27-29 - Shiraz to Kumer and return
- 30 - Shiraz
- July 1 - Shiraz to Bavanat
- 2 - Bavanat to Abadeh
- 3 - Abadeh to Isfahan
- 4-6 - Isfahan and vicinity
- 7-8 - Isfahan to Shah^r Kord and Dastanah
- 9-12 - Dastanah
- 13 - Dastanah to Isfahan
- 14-15 - Isfahan
- 16 - Isfahan to Tehran
- 17-23 - Tehran and vicinity
- 24 - Tehran to Hamadan
- 25 - Hamadan to Kermanshah

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1955

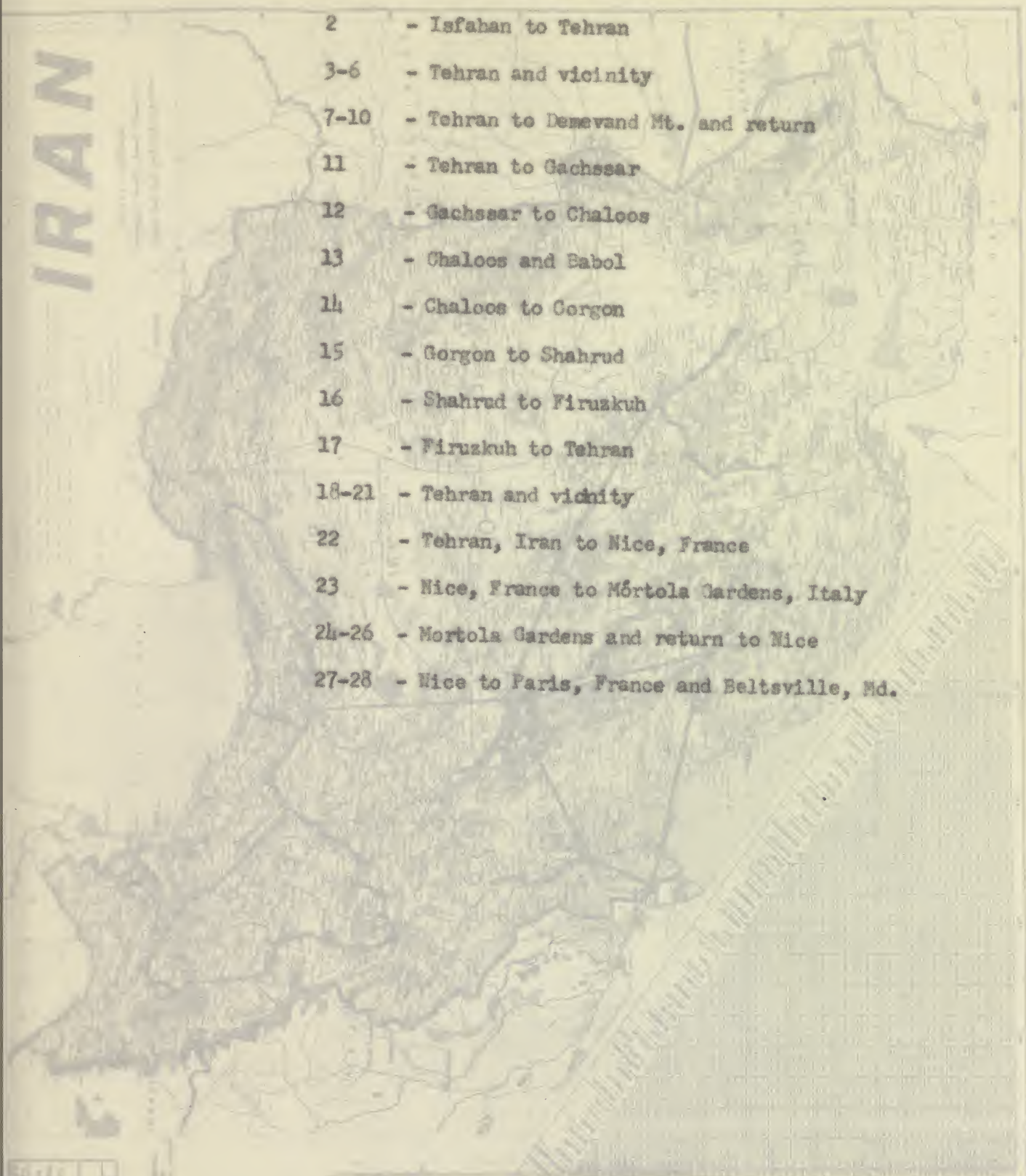
- July 26 - Kermanshah and vicinity
27 - Kermanshah to Sanandaj
28 - Sanandaj and vicinity
29 - Sanandaj to Saghez
30 - Saghez to Marageh
31 - Marageh
- Aug. 1 - Marageh to Tabriz
2 - Tabriz to Marageh
3-6 - Marageh to ^uKuhs Sahand and return
4 - Marageh to Tabriz
5-7 - Tabriz and vicinity
8 - Tabriz to Sarab and Ardebil
9-11 - Ardebil to Kuhs Sabelon and return
12 - Ardebil to Mianeh
13 - Mianeh to Tehran
14-18 - Tehran and vicinity
19 - Tehran to Isfahan
20-21 - Isfahan and vicinity
22 - Isfahan to Dastanah
23-24 - Dastanah and vicinity
25 - Dastanah to Shahr Kord
26 - Shahr Kord to Kurang
27 - Kurang to Kuhs Zard
28 - Kurang to Golpayegan
29 - Golpayegan to Isfahan
30-31 - Isfahan to Musiabad and return

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1955

- Sept. 1-2 - Isfahan to Musiabad and return
- 2 - Isfahan to Tehran
- 3-6 - Tehran and vicinity
- 7-10 - Tehran to Demevand Mt. and return
- 11 - Tehran to Gachssar
- 12 - Gachssar to Chaloos
- 13 - Chaloos and Babol
- 14 - Chaloos to Gorgan
- 15 - Gorgan to Shahrud
- 16 - Shahrud to Firuzkuh
- 17 - Firuzkuh to Tehran
- 18-21 - Tehran and vicinity
- 22 - Tehran, Iran to Nice, France
- 23 - Nice, France to Mòrtola Gardens, Italy
- 24-26 - Mòrtola Gardens and return to Nice
- 27-28 - Nice to Paris, France and Beltsville, Md.

IRAN



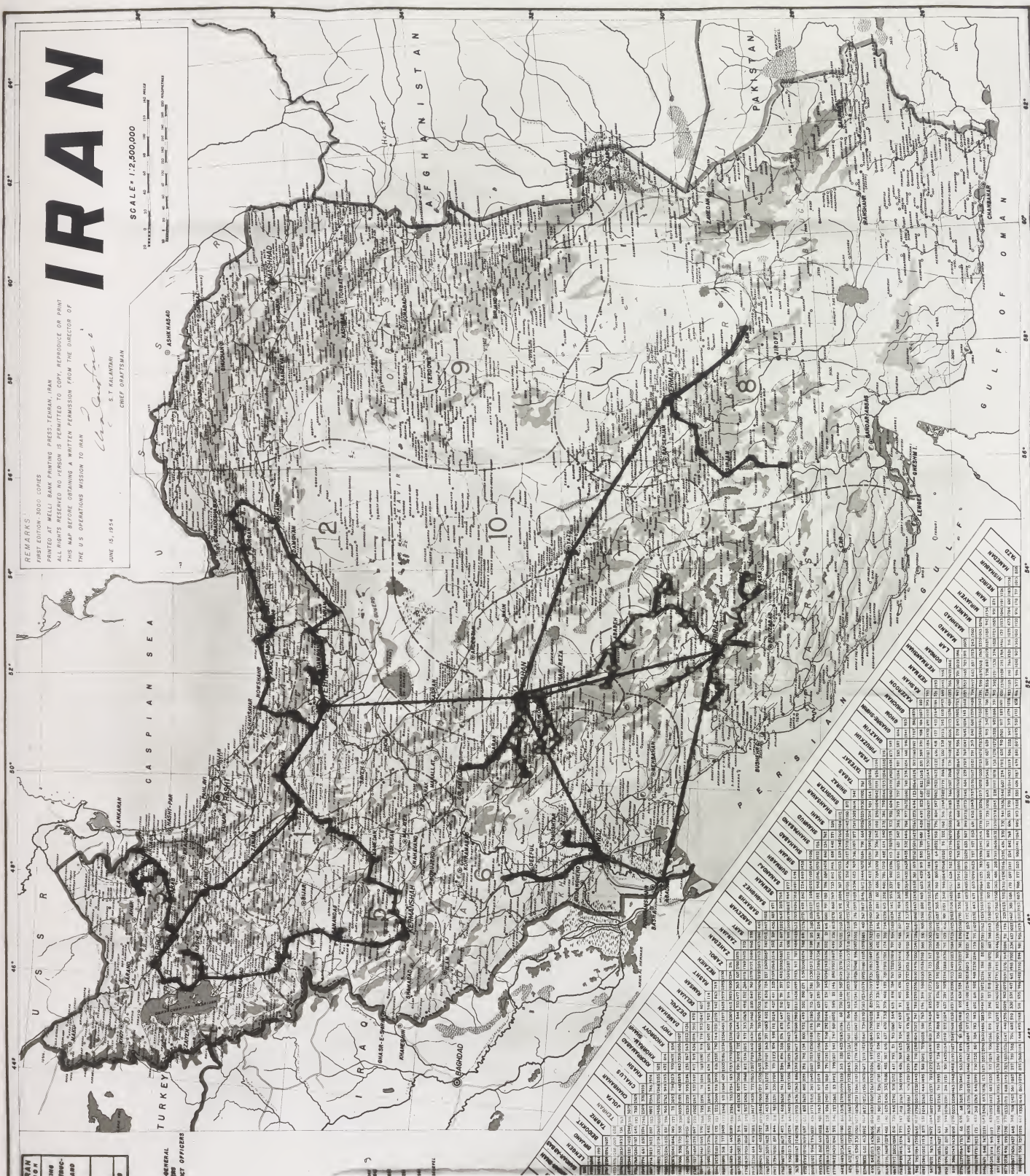
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S. T. KALANTARI
CHIEF CRAFTSMAN

C A S P I A N S E A

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ENVIRONMENTAL BACKGROUND

The Iranian season for the collection of seeds of wild forage plants generally occurs between May 1 and October 1. This is a natural consequence of the winter-spring precipitation regime followed by dry summer. The season and collecting opportunities differ according to elevations and relative aridity, rather than to longitude. The following account considers them according to seasonal development sequence under three nominal areas of elevation with relevant descriptive notes on physiography, climate, and vegetation. As the winter range was not observed remarks are applicable to the summer range only. The former, judging from limited observations and ICA reports, is of considerably less importance as source for forage introductions. Animal subsistence on the winter range is mainly supported by the quick winter-spring lowland annuals, shrub browse, and the stubble feeds of cultivated lands.

The Lowland Area

During May and June seed maturation is to be found in the arid lowlands only. The early desert ephemeral annuals are the first and are followed irregularly by the perennials, some of which bloom early, other late. Species with desirable characters for introduction are rare. Among the common genera are Aegilops, Festuca, Bromus, Hordeum, and Medicago, many of which are desired for genes rather than as potential cultivates. The seeding season for the early desert annuals is short and below 3,000 feet elevation is about done by June 30.

The insect season for the collection of seeds of this forest

climate generally occurs between May 1 and October 1. This is a

seasonal phenomenon of the temperate-zone vegetation region followed

by dry summer. The season with collecting opportunities after harvest-

ing is abundant and relative activity, rather than is negligible. The

following account summarizes those according to seasonal development

seasons under three seasonal areas of elevation with relevant doc-

umentary notes on climatology, climate, and vegetation. As the winter

range and not observed weather are applicable in the summer range

only. The forest, including low limited opportunities and the winter

is of considerably less importance as source for forest information.

Seasonal variations on the winter range is mainly supported by the

winter winter-spring forest climate, which covers, and the climate

looks of collected forest.

The forest area

During May and June seed collection is to be found in the area

forest only. The early forest opportunity season is the first and

are followed irregularly by the seasonal, some of which occur early,

other late. Species with suitable characters for introduction are

two. Among the common genera are *Populus*, *Salix*, *Juniperus*, *Pinus*, *Quercus*,

and *Wentia*, many of which are desired for forest timber as

potential materials. The seedling season for the early forest season

is about mid-June 3,000 feet elevation is about June 10.

The following account of southern Iran, written in the field during May, provides general descriptive notes as a background for the collections obtained in the Lowland Area and much of the Plateau Area as well.

The climate of southern Iran is an arid Mediterranean type and is very similar to that of southern California from the Tehachapi Mountains south. Like California it is more moist on the west and dry desert on the eastern side of Goshkai-i-Bahktiari ranges. These are part of the great Zagros Range. Unlike California, however, it has no maritime fog belt. In southern Iran they say they have no summer thunder showers, while these are of annual though light occurrence in the San Bernardino and San Jacinto Mountains of southern California. Both areas occupy about the same latitudes and both have elevations from near sea level to over 10,000 feet. Except for some edaphic differences, plants from either world would grow in comparable habitats of the other.

Physiographically, southern Iran is a "Basin and Range Province", as bolsons of large and small size are numerous and with the sharply ascending rocky-sided mountains characterize the topography distinctly. Due to the lack of summer cloud bursts, the conspicuous, high ascending conglomerate fans clogging the mouths of our south-western canyons are here absent and the gulch-gulleyed U-shaped arroyos as well. Under the slow light beat of winter rains only, these Persian bajadas are low, even, and lightly laced by the imbricated patterns of sheet-flooding. Mountains all but swallowed by the alluvium of the valleys are widely common and give the appearance of disjuncts because the

intervening ridges have been covered by a long active sedimentation stage. Thus does a precipitation pattern express itself through topography and we could ask for no better verification of the native report that southern Iran has no summer thunder storms.

The western part of the area traversed so far as observed is completely sedimentary with limestone and limy sandstones predominating. About Kerman volcanic igneous has intruded the sedimentaries. Saline soils are common about the bolson water standways or intermittent lakes. Between Shiraz and Isfahan gypsiferous sedimentaries are extensive and much of the mountain slopes and intermittent lakes are therefore sterile. Nothing comparable to our southern California granodiorites was observed. Some of the valleys have extensive areas of dune sand and from the air show both linear and crescentic types as well as some mounded and peaked forms, reflecting variable winds of changing direction, and which appear to be correlated with the deflective influence of mountain situations. The best soils appear to be the silty gray desert earths of the well-drained bajadas of mild gradients, where washing has removed the mineral salts to plant tolerance levels.

Vegetation is very sparse due primarily to the arid climate, as little as 5 inches annually about Kerman, to salt-toxic soils, and abraising sand. Furthermore, it has thoughtlessly been over-exploited for centuries, at least from the time of Persepolis and the Darius kings. However, among the bitter and the spiny species, considerable "natural" vegetation exists upon areas of better soil. In localities where stock-water is not available such plants are also accompanied

interesting thing that was found in a large white container
stage. This was a small white container which was found

pottery and in this was the better condition of the white

report that further down in the same container.

The second part of the same container was not as clean as

the first part and was found with some small pieces of pottery

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by a variety of forbs and grasses. Some of the better plant communities noted are the following, named here for convenience and not in accordance with any established ecologic terms, which, if they exist, are unknown to me.

An *Amygdalus*-*Pistacia* association occupies much of the mountain slopes in the area around Shiraz. The scattered *Pistacio* trees and wild Almond shrubs are accompanied by several species of thorny bush *Astagali* and *Artemesia* with a thin ground cover of annual herbs and grasses. Among the latter *Aegylops* and several species of *Bromis* are very common. Both of the wild almonds are true xerophytes, one of tall broom-like habit has green branches, ephemeral leaves, becomes a polypodial tree in size, is used as grafting stock, and will be discussed later. The wild pistacio trees are very old, have been repeatedly topped for firewood, and bear small edible nuts. This community occupies the rocky almost soilless slopes between 6000 and 8000 feet on limy sedimentaries.

An *Artemesia*-*Stipa* association exists upon a wide plateau between Shiraz and Isfahan, occupying elevations between 7500 and 8500 feet. The bushes are evenly dispersed, about knee-high, and are accompanied by sparsely spaced grasses and other herbs. A scattering of an ornamental species of *Eremurus* is present, but it becomes more abundant at slightly lower elevations and just south of Abadeh formed broad patches of white and pink over the alluvial valley flats. The life form of this association greatly resembles some of the pure extensive stands of burr sage (*Franseria* species) of southern Arizona, as does the following.

[illegible][illegible]

An Artemisia-Lycioides shrub vegetation appears like a natural climate expression over many of the higher slopes, 7000 to 9000 feet, in the Kerman desert area. The larger Lycium-like shrub has been extensively pulled as firewood, leaving only the bushy Artemisia and accompanying low bush Astragalus as perennial principles. ^(Fig. 1) It is accompanied by perennial grasses of several species, rather numerous umbells, and rarer legumes. A few of the latter were found only growing in the protection of the bushes.

On the intrusive igneous hills both south and east of Sirjan there exists a singular low perennial herbaceous cover characterized by an ornamental yellow-flowering and yellow-leaved umbell, "Jashir", and the extraordinary, big-leaved, wild rhubarb. The three or four leaves of the latter are 16 to 24 inches in diameter, lie flat upon the ground like platters with raised edges, turn red below and when observed were drying, abscissing just below the soil surface and were being blown away by the wind to leave only the diffuse panicle of reddish-purple inflorescences standing alone. The soil of this habitat is thin, rocky, and rather barren and occupies elevations between 6500 and 8500 feet.

Where not cultivated, the dry silty valleys in the Kerman area are either barren or occupied by two or three species of leafy bitter but green and thriving perennial herbs. Two of them are Astragalus species, the other is a common weed, observed from Western Pakistan and Afghanistan to here. They say that sheep and goats eat the Astragalus after they have flowered, fruited, and dried.

Grasses and legumes or forages

Palatable and nutritious annual grasses were found to be very scarce in the early desert area. Some are eaten by livestock only when green and tender, while others were not touched at all, as some of the fox-tail or brome types. Those of this type that were collected were picked up because of belonging to genera on the want lists and presumably are wanted for breeding trials, as Bromus and Aegilops. It was too early for even the desert perennials to be seeding, and most of those were harsh and unpalatable and some not touched by animals, so far as observed, as a bushy species of perennial Pennisetum collected two years ago in Afghanistan. On some of the higher elevations, as in the Artemisia association, palatable perennial grasses were observed, judging from the browse marks made by the wild gazelles and ibex. One of the better appears to be No. 14809 with brittle culms and short hairy leaves sent in as an Oryzopsis but more probably a species of Arrhenatherum, a "tall wheat grass". Poa bulbosa, so abundant and important as a sheep forage in Afghanistan was observed of only spotted occurrence in ecotypes or varieties less attractive than the Afghan ones.

Several varieties of button and burr Medicagos were found in both the Ahwaz and Shiraz areas, but were lacking in the drier Kerman area. A few of the varieties appeared as though they might be short-lived perennials and the majority were of prostrate habit. Clovers or Trifolium and Lotus are also common in the first two areas and some appear as having some experimental value as cover crops or in selective breeding programs. This group should become more interesting as the higher elevations with better soils and moisture are reached later in

Growth and Development of the

Physical and mental growth were found to be very

marked in the early stages of life. They are noted in the early

stages of growth and development. While growth is rapid at first, it

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and it is noted in the early stages of life. It is

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the season. Some low habit Astragali looked promising about Shiraz both for forage possibilities and as cover or green manure crops, and one species was reported to be in cultivation for cattle feed and will be secured later.

The outstanding forage encountered is clearly the Bam alfalfa, which is reported to be indigenous to that oasis desert area and to be highly disease-resistant. Two different lots of this were obtained. I observed it growing in the walled fields of Bam, where it is planted in small plots alone or in young date orchards on the irrigated silty gray desert earths (Photograph 4). The climate there is quite comparable to our Imperial Valley, except for the latter's low elevation, or the Lancaster Valley of San Bernardino County, California, except that the latter has heavier winter frosts. Although the elevation is 3000 feet at Bam, the winters are quite open and Citrus is regularly grown there and a trial lot of bananas has been set out. The agriculture director at Bam stated that the Bam alfalfa yielded 25 to 30 metric tons of cured hay per hectaria per annum, secured in 10 to 12 cuttings just before flowering. The flowering field I saw being cultivated for seed was above knee-high in thick stand and was producing curled pods in good numbers and it appears to be a good seeder although few insects were seen at work. This alfalfa appears to be the equal of our best varieties. However, it is reported to do rather poorly at Kerman about 150 miles away at 5800 feet elevation.

Nuts

Almond culture can bear looking into, judging by the curious things I have heard reported. Some of the almond growers achieve late-flowering forms by grafting improved cultivated varieties on native wild stocks. the broom-like shrub described at

interpreter assistant at Shiraz, also informed me that cultivated almond was also brought out of the orchards and grafted upon the wild plants growing on the hillsides at several localities east of Shiraz. In this way they are able to produce almonds in unirrigated lands with rainfall entirely insufficient for the needs of the cultivated almonds. I shall look into this upon my return to the Shiraz area. I shall also procure some ample lots of seed of this wild almond, which were in green fruit two weeks ago. The seeds of this species and a low spiny shrub of wild *Amygdalis* are reported to be exported for oil extraction to Germany, presumably for amygdaline. Both of them apparently could ecesize easily upon the semiarid slopes of our southwest and the taller broom one has its life form counterpart in Canotia holocantha of southern Arizona.

Vegetables

I have as usual picked up a general variety of vegetable seeds in the bazaars of the principal towns visited. The cucumbers and a romain-type of lettuce are outstanding in flavor and growth vigor. Notable also are a couple of carrots; one has a canescent gray foliage with small pale root, as observed growing in Shiraz, of interest perhaps to carrot breeders. A second is reported to develop a root as much as two feet long; also secured in Shiraz. Many of the seeds secured represent vegetables grown locally, but seed stocks were reported to be produced in Isfahan, apparently a seed producing locality.

Oil Seeds

Two seed samples noted as Helianthus on the labels, are more probably of Carthamus tinctorius and will be of interest to Pultz. What I take to be seeds of Recinus persica (if that species is any good) were encountered in two instances. I remember that a plump-seed seed of

Linum was also picked up in one of the markets.

As for other things, an unusual type of mung bean, Phaseolus aureus, was secured in the Kerman market and reported to come from Jirof. Jirof is a rather isolated oasis southeast of Kerman, nearly bordering on Beluchistan. The roses of Shiraz are splendid, proudly fancied by the inhabitants, are commonly grafted on wild stocks, and if I knew our own roses, I doubtless could make some select additions for the rose fans. At the hospitality of Mr. Houstaian, I partook liquid refreshment with him in his home. I was served syrup of roses flavoured with lime juice; a refreshing and novel drink. I had always supposed that rose water was made for lotion or anointing purposes, but they drink it in Shiraz. It is extracted from a variety of rose expressly cultivated for the purpose, cuttings of which I sent from there. Both the rose and the syrup are highly scented. The syrup is extracted by boiling or steaming the flowers in water.

The Plateau Area

The medium elevations of Iran, 4,000-6,000 feet, comprise the largest area considered here, as most of the large Iranian Plateau rests within those elevations. A large portion of this goes to waste as the sterile bolson of the Dashte Kavir (the salt desert). Outside of this, mainly to the West, the remainder has a varied desert vegetation. There is open scattered tree growth on the western and southern slopes of the great Zagros range. Eastward of these scattered tree growth communities, most of the cover consists of low bush and scattered shrub with sparse intervening herbaceous growth. Generally

There was also a hint of the end of the world.

As for the things, the usual type of thing was,

the usual thing, the usual thing, the usual thing, the usual thing.

And then there was, there was a very small, very small, very small,

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The Indian Land

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there is a precipitation gradient of decrease from West to East, so that the longitudinally aligned Zagros range exerts a screening effect in the same way that the Sierra Nevada range does in California.

The seeding season of this area follows that of the desert lowlands rather closely and occurs generally between June 1 and August 1. Perennial grasses and legumes, however, are much better developed in species and palatability. Among the prominent forage genera are Bromus, Stipa, Oryzopsis, Hordeum, and Onobrychis with obvious xerophytic and survival characters of value. Browse is also afforded by a wide range of spiny or shrubby or low perennial species in such families as Compositae, Polygonaceae, and Leguminosae. Palatable legume perennials are very scarce, being limited generally to scattered individuals protected or hidden by impalatable bushes or to such dodgers as spiny Astragalus, Lycium, and Mimosaceae. Due to rapid drying of soil in the late spring months, seed suddenly matures in a short seeding period at any given locality; perhaps of as little duration as two weeks. The bromes appeared to go to seed especially fast. I was told by the Iranians that spring rains had generally been very light and this seasonal condition doubtless accentuated the rapid maturation of seed with the short growing season. I found seeding most abundant generally through latter June and early July. Additional general descriptive notes of the vegetation types and the seed collections are given in the above enclosed field account of May 20.

Typical views of the highland rangelands are shown in photos 1, 2, 3. Individual species of the forage plants often show outstanding characteristics, as the ability of Poa bulbosa to survive close grazing. Hordeum kurdistanicum is usually unpalatable, but some colonies were composed of scattered individuals closely browsed, side by side with those which were not eaten. This suggests that there may be a segregating palatable strain in a species generally kept unpalatable by long over-grazing. As it has high survival and soil pioneering capacities in an arid climate with poor soils, the added character of palatability would make it highly suitable for trial introductions. Notable also is the xerophytic Arrhenatherum elatius bulbosum with bulbous offsets, which appeared to be well-liked by the cattle. The most valuable existing forage group through the central plateau area, however, appeared to be the perennial bromes. These are composed of rather many varieties in several species. In nearly all of them the soft rather succulent leaves were liked by stock. Their ability to seed quickly and endure recurrent drought have enabled them to survive where other palatable species have failed. Among the Stipas and Festucas are many species just as hardy and persistent, but they do not produce as much nor as palatable forage as the bromes.

The plateau range lands generally receive from 8 to 15 inches of precipitation annually, part of which falls as snow. The better pasture areas are above 7,000 feet elevation and where lack of stock water has always limited animal grazing. Some of the latter appear to have a natural vegetation only moderately affected by grazing and

can serve as guides to range studies and management. Such a semiarid climate develops only an open sparse cover with short bush dominating the landscape, photo 1. Palatable grasses and herbs form only a small percentage of the cover. Were the unpalatable bushes and weeds removed from the plateau range lands and replaced with edible forage plants, it appears that range capacity could be increased many fold.

The High Mountain Area

It is only in the high altitudinal region that grassland occurs as a vegetational dominant. These ^{grasslands} exist above 8,000 feet and below 11,000 feet elevations, while the best ones observed were around 10,000 feet in four distinct mountain areas of northern Iran; the Sanandaj area of Turkestan, the Kuhe Sahand of Azerbaijan, the Kuhe Sabelon of Azerbaijan, and the Kuhe Demevand of El Borj Range. Excellent forage grasses are abundant in all of them. These are all mountains of volcanic origin, the latter three forming spectacular high conic peaks with some permanent snow cover and reach elevations of 12,000, 16,000, and nearly 19,000 feet respectively. The seeding season in all occurs mainly during August, though many species, as among Festuca and Bromus, are available in latter July, while many of the Agropyron do not mature until September.

These high altitude grasslands divide naturally into meadow and slope communities. Both are relic in character, as they have been able to survive, at least in anything like a natural state, in only relatively small and few areas. This occurs where traditional social customs have operated to protect pastures from the predominate

over-grazing which has widely destroyed them elsewhere. All the four areas listed have been given some special protection by ruling families, primarily as grazing reserves for valuable horses and camels. At the present time pastures on Kuhe Sahand and Kuhe Demevand are maintained for cavalry horses for the Iranian army.

The slope grassland consists mainly of species of Bromus, Festuca, and Agropyron. Many communities are dominated by the first two genera and can be designated as the Bromus-Festuca association. Bromus is particularly rich in species, varieties, and intergrading forms. Members of these two genera are accompanied by many species in the genera Cryzopsis, Poa, Agropyron, Elymus, Andropogon, and Alopecurus, among others. They cover the well-drained slopes which are frequently rocky. On the better soils they cover up to 70-80% of the soil surface while retaining a bunchy aspect, or facies as Clements would have said. On high volcanic rocky slopes extensive colonies of Agropyron cristatus frequently replaced the more general Bromus-Festuca association. The former may be regarded as a soil pioneer, while the latter appears as a natural community in balance with the climate and characteristic of extensive areas between 9,000 and 11,000 feet elevations in northwestern Iran, photos , .

Agropyron 15510 (229582) on the better slope soils of Kuhe Sabelon formed a 100% consociational cover, photos , . The stature of such stands varied from shin-high to hip-high, depending upon slope exposure and soil depth. Agropyron 15503 (229581) also formed nearly pure communities upon the loose volcanic tuffa sand of the same mountain at around 8000-8500 feet elevations, but as a bunch

grass of open aspect, photo . Generally, however, Agropyron species are present as scattered individuals and rhizomatous clones helping to form a sparse open cover of more than average stature. Some of the bunchy forms reach two meters in height. They mingled with the Bromus-Festuca and the Agropyron cristatum communities, as well as with the bushy shrubs of Astragalus, Craetegus, Prunus, etc. Some of the species are highly variable and appeared to intergrade. All appeared to be palatable but some are obviously more preferred by cattle. Some species grow both upon limestone and volcanics, while others, like A. cristatum, were found only on volcanics.

Dactylis glomerata is common both in and out of grassland proper. It prefers well-drained soils, occurs in both limestone and volcanic areas, along meadow slopes as well as upon rocky heights, and may be found in small colonies along canyon streamways as low as 5000 feet elevation. It is always of scattered presence and appeared to have varietal differences in some localities. It is a hay component of some of the pastures so-used in Azerbaijan and is everywhere palatable.

There are many excellent forage potentials among these high-land grasses for western and northern United States; a bonanza to the plant prospector.

The meadow lands of the Iranian mountains are rich in grasses and contain several variable species of Trifolium. The habitat grades from the mesophytic to the aquatic with grasses dominating. There is a strong tendency among many species to form pure colonies. As these are limited in extent the general aspect is apt to be patchy

with each area distinguished by one or two colonial dominants. The moist or watery bottomlands, where ungrazed, have deep, dense, heavy cushions of succulent blades, while the better drained margins may have dense turf-like cover, or bunch grass spotting the turf. In the margins the slope grasses mingle with those of the meadow proper and the composition is rich and varied.

Among the most prevailing grasses of these highland meadows are Hordeum 15447 (230255), photo , several species each of Alopecurus, Andropogon, Glyceria, Festuca, Elymus, and many others. The more common legume associates consist of Trifolium pratense, T. repens, and others. Less abundant are species of Medicago and Trigonella, some of which are rare and insignificant as forage elements.

Extensive meadow grasslands extend down through the high valleys of the Zagros range of western Iran. They were visited in four principle areas of Kurang, Charmahal, Semiron, and Kowkun, but in all of them the pastures were completely cut or gnawed down by seeding time. These are the historical summer grazing lands of the nomadic tribes of Lur, Bahktiari, Goshkai-i, and Goshkuly respectively,

Except for the meadow land species, and the tolerated weeds of the grain fields, the palatable legumes of Iran are very scarce. They appear to exist only as rare survivors in a land long over-grazed. Two wild Vicia are of special interest, Vicia monantha of the Zagros mountains of Charmahal and Vicia 15435 (229550) of Kuhe Sahand. The former was found upon limestone at 10,000 to 11,000 feet elevations, where snow lies for a large portion of the year. It is a deep rooted polypodial perennial forming a bush 8-10 dm. tall, at first densely

erect, then open with reclinate stems after anthesis. Vicia 15435
(227590) is also a perennial forming a low spreading dense bush and
thrives upon rocky volcanic slopes of high elevations. It appears
to be less palatable than V. monantha, but both should be given close
attention to detect any unusually palatable individuals which may
appear under multiplication culture. Both make a quick foliaceous
growth during the short growing season prevailing at such high eleva-
tions. The possibility of the existence of segregating palatable
forms among such populations has been noted above with Hordeum
kurdistanicum. (L. 15435)
Total numbers ----- 114

Table 15. Seed collections retained in form during the spring-
summer season of 1955.

Table 1 lists the collections according to some principle
ecological segregation. Wild forest grasses and legumes account for
over half of the entire collection. Only two or three species of
forest grasses were found to be cultivated as regular crops.

Hordeum and Hordeum. The former was
found in Kurdistan Province, especially around Harir in mountain-
ous areas. It was cultivated for hay either mixed with barley
or by itself. Hordeum glomerata also appeared to be planted in
the same region, as it frequently grew mixed with barley and other
crops, but the point was not definitely determined.

Most of the cultivated forest legumes of form consist of
Medicago sativa, Trifolium pratense, T. repens, and Anthyllus

SUMMARY OF SEED COLLECTIONS

Wild forage grasses	500
Cultivated forage grasses	3
Wild forage legumes	193
Cultivated forage legumes	31
Pulses	47
Grains	24
Oil seed cultivates	24
Cultivated vegetables	93
Cultivated cucurbits	44
Fruits and nuts	65
Spices	35
Ornamentals	68
Gum tragacanth (includes hb. specimens)	40
Miscellaneous	116
Total numbers	1283

Table 1: Seed collections obtained in Iran during the spring-summer season of 1955.

Table 1 lists the collections according to some principle economic segregates. Wild forage grasses and legumes account for over half of the entire collection. Only two or three species of forage grasses were found to be cultivated as regular crops, Agropyron (229471) * and Sorghum halapense. The former was found in Azerbaijan Province, especially around Sarab in considerable area. It was cultivated for hay either mixed with barley or by itself. Dactylis glomerata also appeared to be planted in the same region, as it frequently grew mixed with barley and sainfoin, but the point was not certainly determined.

Most of the cultivated forage legumes of Iran consist of Medicago sativa, Trifolium resupinatum, T. pratense, and Onobrychis

* Also PI 229476

viciaefolium. The largest area for these appeared to be devoted to alfalfa and many strains are said to exist, which is to be expected as northwestern Persia is its origin in cultivation. The species is widely present as an escape or simply wildy spontaneous. Efforts to secure seeds of such plants, however, were frequently frustrated by animals that usually cropped the plants before seed maturation.

Trifolium pratense is seeded in grazing pastures, while T. resupinatum, or Persian clover, is more commonly cultivated for cutting along with the small plot garden vegetables. It appears to grow best at elevations above 6000 feet.

Onobrychis viciaefolium, or sainfoin, is preferred by some cattlemen of Azerbaijan Province to alfalfa, as they stated it was better liked by cattle, gave higher milk production, and cured more easily. It is a strong-stemmed erect perennial lasting for three years, normally affording two to three cuttings per annum, and was reported to average more tonnage per cutting than alfalfa, although somewhat less on a per annum basis. A powdery mildew badly infected many fields of this forage during August and September in the Azerbaijan Province. All of these cultivated forage legumes have relatively high water requirements, and so far as observed are cultivated in Iran by irrigation.

In listed grains are included wheat, rye, maize, millets, and barley, although the latter certainly has as much use as forage as it does as grain.

Among the oil seed cultivates collected is a series of the small-seeded Ricinus which Panova recognized as a separate species.

vinicolis. The largest ones for these animals to be hunted
in alfalfa and very common and also to other things in the
ground as gambusia forms in the water in cultivation. The
species is slightly present in an average or slightly abundant.
There is some number of small fishes, however, and especially
frequent in alfalfa and mostly around the grass before water
irrigation.

Hydrophilus presents in water in average number, also in
gambusia, or gambusia forms, in water mostly collected for
feeding along with the small of the ground gambusia. It appears to
grow best at elevations above 1000 feet.

Hydrophilus vinicolis, or vinicola, is common in some
sections of alfalfa, but common to alfalfa, as they collect in the
water that is left, and often with gambusia, and other small
fishes. It is a common element in the water left for the
cows, usually showing the gambusia and other small fishes, and the
species is common in alfalfa and other things, and is
common in a few small ponds. A number of small fishes are
very little of this form, and the gambusia in the water
left for the cows. All of these collected forms are common in
alfalfa and other things, and in the water and collected
in the water.

In these places are collected gambusia, vinicola, and
other, and the gambusia is very common in the water and in
the water.

Among the small fishes collected in a number of the
water, and the gambusia is very common in the water.

persicus. These should be of interest for their dwarf size and early fruiting habits.

Fruits and nuts include several pristine forms of possible interest to breeders of such crops and include both wild and cultivated forms. A special section on phases of almond culture in Iran is given below.

A series of gum samples of several species of Astragalus producing the gum tragacanth of commerce was secured for the Central Regional Research Laboratory. Incidental to the forage work, a field survey of this group of plants was made, seeds were obtained for test plantings and a study of the group is given below.

Under miscellaneous are included a diverse group of offerings which do not fit conveniently into the above categories. The 116 numbers include such items as wild medicinal and seasoning herbs, browse or wild hay plants among the Umbelliferae, Compositae, Cruciferae, and others, relatives of cultivated vegetables, and some herbarium collections.

... These should be of interest for their own sake and early
... Living fossils.

Various and more modern geological systems of periods
interest to students of each group and should be well
noted from a special section on names of interest in the
is given below.

A series of the names of various members of the
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AREAS FOR FURTHER PLANT EXPLORATION

There are two general areas in Iran which have been only partially collected by the Smith and Gentry excursions of 1954 and 1955. These are the western slopes of the Zagros Range in western Iran and the El Borj Range of northern Iran.

The western slopes of the Zagros through the middle and higher elevations support tree growth of oaks, ash, pines, Prunus, and other Rosaceae. The areas about Korramabad and south and west of Kermanshah should contain many species of grasses of xerophytic types with valuable survival characters. They are inhabited by people of the Lur tribe, however, and as these people continue to practice and venerate robbery, forays into such areas should be made with preliminary care. The field man should make certain that he proceeds under the auspices of an influential chief, as only such a person may protect him from robbery and assault by tribal members.

In northwestern Iran more localities like Kuhe Sahand and Kuhe Sabelon should be searched for, as both the highland slopes and meadows appear to foster endemic varieties within broad complex species, as Agropyron and Bromus. The same can be said for the Borj Range around the southern Caspian area. The Lor River area of the Borj is readily accessible by car and horse from Tehran and was reported by ICA range men to have excellent grassland, which has been protected from over-grazing as another summer range for army horses. Access can be arranged through the Iranian Army Department. Further east in the Borj Range there are reported to exist extensive plateau

THE ECONOMIC SITUATION IN THE NORTH

During the last few years, and it is not only the north but the whole of the country, has been suffering from a general depression. The depression is the result of the depression of the world economy in 1929. It is not only the north but the whole of the country, has been suffering from a general depression. The depression is the result of the depression of the world economy in 1929.

The depression is the result of the depression of the world economy in 1929. It is not only the north but the whole of the country, has been suffering from a general depression. The depression is the result of the depression of the world economy in 1929.

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grasslands with extensive stands of Agropyron. Such ranges have survived the merciless over-grazing for lack of stock water on these broad upland tracks. Wild ibex and gazelle are said to exist upon them in large numbers. Such grasslands are reported to exist northward and westward of Meshed. The writer had expected to visit one of these eastern areas, but the sudden termination of the seeding season in Iran severed the plan. Some of these grasslands, as southeast of Gorgan, are reported to be cut for hay.

In conclusion it can be said that the fine assortment of range forage genera located in northern and northwestern Iran, indicate that much excellent experimental germplasm could be added to our collections by another seasonal foray into the areas indicated above.



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